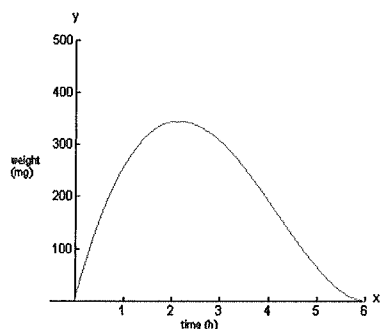


From Precalculus handouts, tests

### CW assignment – Nonlinear Inequalities

Pharmacists label medication according to how much should be taken and how often the medication should be taken. Because oral medication requires time to take effect, the amount of medication in your body varies with time. The following graph models the number of milligrams of a certain pain reliever in a person's bloodstream 6 hours after taking 400 milligrams of it.



At what time is the level of the pain reliever in the bloodstream above 300 milligrams?

(Use your calculator -- The curve is modeled by  $y = 0.5x^4 + 3.45x^3 - 96.65x^2 + 347.7x$ .)

### Test on exponents and logs

The table below gives the population for China and for India at 10-year intervals starting in 1950.

	Population (in millions)					
	1950	1960	1970	1980	1990	2000
China	563	651	820	985	1148	1269
India	370	445	554	685	838	1004

(Source: Geohive.com)

- Find an exponential regression model for each country's population. Write the equations for each country. (2)  
China: \_\_\_\_\_ India: \_\_\_\_\_
- Use your models to predict each country's population in 2008. (2)  
China: \_\_\_\_\_ India: \_\_\_\_\_
- The UN projects that by the year 2050, India will overtake China as the world's most populous country. Do your models support this conclusion? Explain. (2)

### Semester 1 exam

The day of the year when the sun rises the latest and sets the earliest is the day with the least amount of sunlight. In the Northern Hemisphere this day is always December 21. On this day in Shanghai, the sun always rises at 6:49 AM and sets at 16:57 PM. The day of the year with the most amount of sunlight is on June 21st. when the sun always rises in Shanghai at 4:50 AM and sets at 19:01 PM.

a. In the table below fill in the column called "Decimal Equivalent" by converting each number of hours and minutes into a decimal number. Round each to the nearest hundredth. [2]

	Sunrise	Decimal Equivalent	Sunset	Decimal Equivalent	Amount of Daylight
December 21 (Minimum)	6:49 AM		16:57 PM		
June 21 (Maximum)	4:50 AM		19:01 PM		

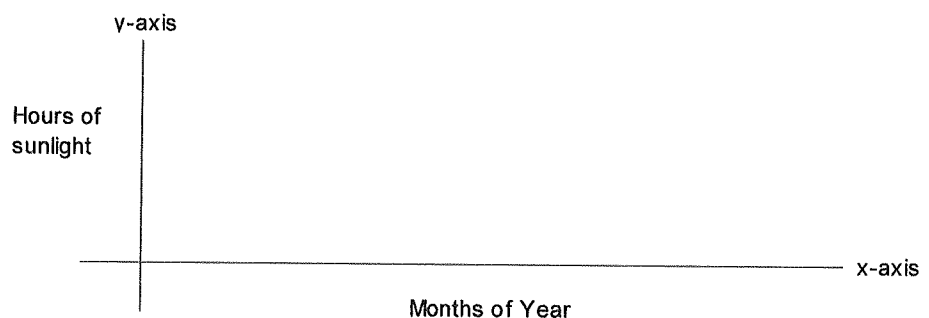
b. Fill in the last column, "Amount of Daylight", with the total amount of daylight hours for both days. Round each number to the nearest hundredth. [1]

c. Assuming a sinusoidal function, calculate the amplitude, showing your formula and work. Round to the nearest hundredth. [1]

d. Calculate the vertical shift, showing your formula and work. Round to the nearest hundredth. [1]

e. What is the period for this data? Calculate the "B" value for your function exactly. [1]

f. Using the graph below, sketch one period showing the curve, its midline, its maximum and minimum, and its period. [1.5]



g. Using the cosine function, calculate the phase shift and your "C" value, using your data for June 21. Show your work, and round your "C" to the nearest hundredth. [3]

h. Use your answers obtained above in #3-6 and write your final equation in the form of  $y = A \cos (B x + C) + D$ . [1.5]